SECTION 3

Summary of Three Projects Completed During Federal Fiscal Year 2002

Completion reports were submitted for three projects during Fiscal Year 2002. The following are brief summaries for the Lower Boise River Coliform Bacteria DNA Testing Project, the OX Ranch Agriculture BMP Implementation Project, and the Ground and Surface Water Interaction Related to Nutrients Within Mason Creek Agricultural Drain Project.

Lower Boise River Coliform Bacteria DNA Testing

Location and Background

The lower Boise River watershed begins at Lucky Peak Dam and continues approximately 40 river miles to the confluence with the Snake River near Parma, Idaho. This watershed is approximately 1,300 square miles and contains about one-third of Idaho's population. The land use varies from urban and suburban uses to agricultural farmland. Approximately 350,000 acres of irrigated farmland are contained in the watershed. The irrigation water is diverted from the lower Boise River and distributed through a series of canals and ditches to individual farms. The return water from the agricultural fields, as well as storm runoff, is collected through privately owned drains that discharge to the lower Boise River.

Publicly owned wastewater treatment plants that use secondary treatment technology prior to discharging to the lower Boise River serve approximately 260,000 people living within the watershed. Approximately 100,000 people within the watershed use private septic systems.

In 1992, DEQ placed the lower Boise River on the state 303(d) list as an impaired water body. The designated uses for the lower Boise River are cold water, salmonid spawning (upper reaches only), primary and secondary contact recreation, potable water (upper reaches only), and agricultural water. Nutrients, dissolved oxygen, grease and oils, temperature, sediment, and bacteria were identified at that time as impairing the designated uses. A formal TMDL document was submitted to the U.S. Environmental Protection Agency in December 1998 and approved in January 2000. Several pollutants were eliminated as potential problems during the subbasin assessment phase of the TMDL, and only sediment and bacteria were addressed. The next phase of the TMDL process includes preparing an implementation plan for sediment and bacteria. This overall plan is being developed from source-specific implementation plans that are being prepared by source groups representing point source municipal and industrial stakeholders, urban and suburban storm drainage interests, and nonpoint agricultural interests.

Results

Through DNA testing, percentages of fecal coliform and *E. coli* have been linked to human, agricultural, avian (non-waterfowl), waterfowl, and other wildlife categories for each of eight sampling stations along the lower Boise River and major tributaries (Figure 4). Results of this investigation will allow the TMDL implementation plan to address how the load allocations for bacteria should be addressed through BMPs. A secondary purpose for this study is to show the applicability of DNA testing technology for use in other watersheds throughout Idaho requiring bacteria TMDLs.

Complete elimination of controllable bacteria sources represents a best-case scenario that is unlikely given the available resources, particularly in the rural areas of the watershed where bacteria concentrations are high. This suggests that a more realistic short-term approach that entails enforcing existing ordinances and permit limits that control human, agricultural, and pet

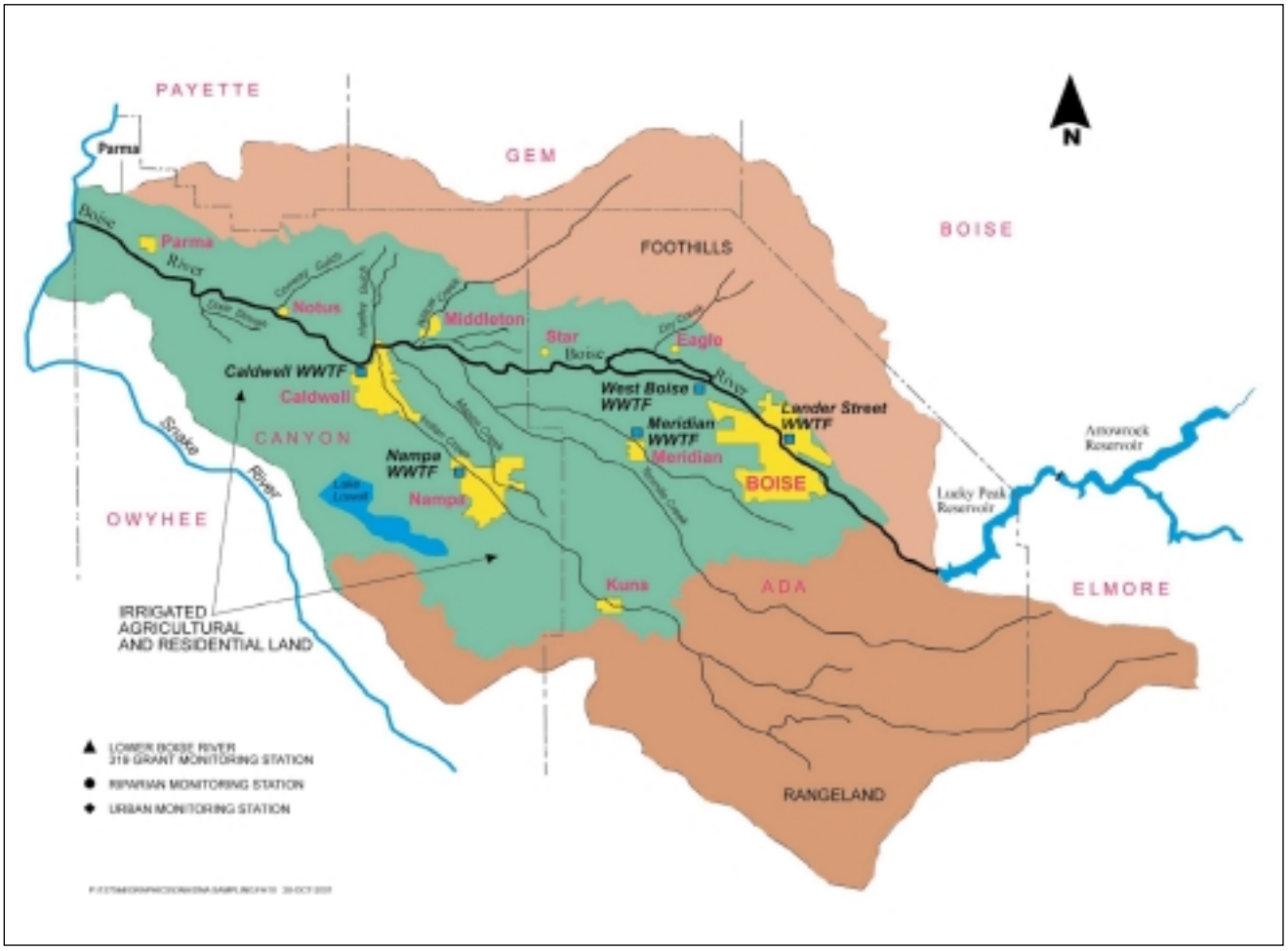
waste should be implemented. As the BMPs that limit the controllable sources are implemented and become effective in the short term, the number of anthropogenic *E. coli* organisms in the water should decrease, leaving the uncontrollable levels as background.

The complete report, including maps, tables, appendices, and figures may be found on DEQ's Web site at: **http://www.lbrwqp.boise.id.us/dna_test/Boise_DNA_Report.pdf**.

FIGURE 4

Lower Boise River DNA Sampling Locations

LOWER BOISE RIVER WATER QUALITY PLAN



OX Ranch Agricultural BMP Implementation Project

Introduction

This project was designed to improve water flows and fish habitat in the Lick Creek drainage. Located in west-central Idaho, Lick Creek drains into the Wildhorse River, which in turn drains into the Snake River (Figure 5). All three drainages are listed as impaired water bodies.

Prior to this project, irrigation water was diverted from Lick Creek and transported in ditches to the OX ranch to be used for irrigation. The NRCS estimated that water lost through ranch irrigation ditch banks was as high as 75 percent. In other words, only 25 percent of the water diverted from Lick Creek was actually being applied to the hundreds of acres of crop and pasture lands owned by the OX Ranch.

Phase I

Livestock compounded the problem of water loss due to leaky ditches. The leaky ditches caused wet areas below the ditches that attracted livestock. While yielding very little value for livestock, those areas became elevated in nitrate, phosphorous, and sediment, which then contaminated Lick Creek. In spite of the landowners' efforts, "ditch-loss" continued to be a problem. Discussions developed on how to reduce this waste and improve stream flows and overall stream health. The NRCS studied the issue and developed a plan to eliminate the ditch by putting the water in a pipe to more efficiently accomplish most irrigation needs for OX Ranch.

In the fall of 2000 a diversion structure designed by the Weiser NRCS and funded by the landowner was built. The structure prevented fish from entering the ditch and allowed them safe passage back to the stream channel. In order to eliminate the ditch entirely, a pipeline was designed to replace 3.1 miles of open ditch. However, cost estimates were so high that it became obvious that the landowners could not afford to proceed. Just when it appeared that this project would die on the drawing board, the landowners began discussions with numerous agencies and conservation organizations about grant funds that could assist in achieving their goals. Through a chain of events, DEQ and NPS 319 funding came into the picture.

Phase II

This project benefits the environment and the rancher by reducing nutrient and sediment loading through improved irrigation and grazing management practices and improved summer water temperatures within Lick Creek.

The pipeline spans approximately 3.1 miles of open ditch. This project furnishes water to 145 acres of land and carries approximately 5.9 cubic feet per second of water. This project also included installation of six off-site stock watering facilities, totally eliminating stock access to Lick Creek and reducing associated riparian impacts.

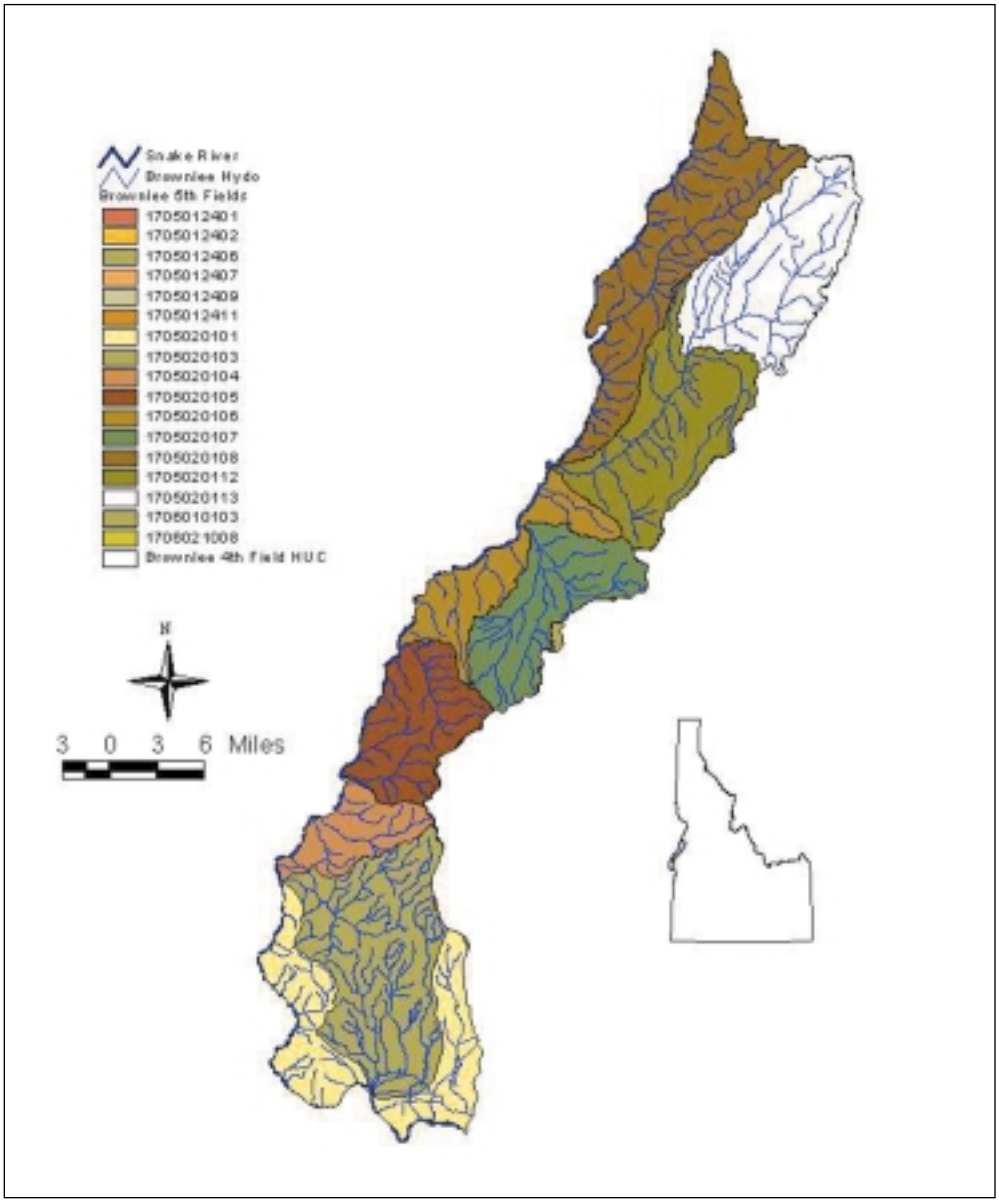
Specific benefits resulting from this project include:

- WATER QUALITY IMPROVEMENTS – This project reduces sediment, nutrient, and heat loading to Lick Creek and the downstream Wildhorse River. Both are currently identified as impaired due to nutrient and sediment loading and elevated water temperatures. The Wildhorse River is a tributary to the Snake River; a TMDL for this segment of the Snake River is currently near completion.

- RIPARIAN IMPROVEMENTS – Off-site water access and facilities (stock watering tanks in six different pastures) eliminated stock access and the related impacts to riparian areas along Lick Creek. Improved riparian vegetation is resulting in less warming of Lick Creek due to denser shading.
- IMPROVED INSTREAM FLOW DURING CRITICAL SUMMER TIME PERIODS – Water savings resulting from elimination of "ditch loss" results in greater instream flows during the irrigation season which will improve fish habitat and stream health and lower summer water temperatures. This will result in improved support of aquatic life beneficial uses.
- INCREASED IRRIGATION EFFICIENCY – Irrigation water can now be applied in a more timely and controlled manner resulting in less runoff and therefore reduced environmental impacts and improved stream flows.

FIGURE 5

Brownlee Reservoir 5th Field Hydrologic Units and Streams



The entire hard copy of the project summary report *OX Ranch Agricultural BMP Implementation Project* is available for public use at DEQ's State Office, 1410 North Hilton Street, Boise, ID. Contact Ms. Barbara Mallard at (208) 373-0502 83706.

Photos showing some of the project's accomplishments follow.

One of two stock ponds with overflow systems created along the 3.1-mile long pipeline.

One of nine water tanks installed along the pipeline.

The pipeline being used for irrigation.

Irrigation along a field of grass near the end of the pipeline.

Ground and Surface Water Interaction Related to Nutrients within Mason Creek Agricultural Drain

Introduction

In 2000, DEQ allocated federal Clean Water Act Section 319 money to the ISDA to study surface and ground water interaction in the lower Boise River Basin at a small scale. The study was initiated as a result of degradation of the surface and ground water systems in the basin due to excessive amounts of phosphorous and nitrogen entering the system over the past several decades. There are thought to be several potential sources of these pollutants, including organics, animal and/or human wastes, and agricultural crop fertilization activity in the area. An additional purpose of the investigation was to gain a better understanding of the system to provide input to the U.S. Environmental Protection Agency required TMDL for phosphorous in streams in the basin.

Project Description

Two sites along Mason Creek in Canyon County were selected for the study (Figure 6). A network of monitoring wells was established in June 2000 at each site and subsequent monitoring and field work were performed through December 2001. Water quality data (collected monthly), physical measurements of the ground and surface water system, historical data, and other on-site data collection provided the basis for the evaluation. Data gathered from the sites provided input to hydrogeologically characterize and statistically evaluate the ground and surface water interaction.

Results

At the upstream site (approximately 5 miles from the confluence with the Boise River) and the downstream site (approximately 1 mile from the Boise River), the data indicate that the ground water system was hydraulically connected and seasonally contributed both phosphorous and nitrate-nitrogen to the drain. Static water level measurements showed ground water to be less than 6 feet below land surface and contouring indicated that ground water flow interacts with Mason Creek. Flow measurements indicate that at both sites the Mason Creek drain gains water rich in phosphorous and nitrate-nitrogen during early spring and loses water during the summer and winter. The gaining and losing stream flow patterns cause complex dispersions of pollutants to ground and surface water. The study suggests agricultural fields can be sources of nutrients that leach into the shallow ground water. The shallow ground water can then flow into a drain, increasing the nutrient load of the surface water and ultimately the Boise River.

Recommendations

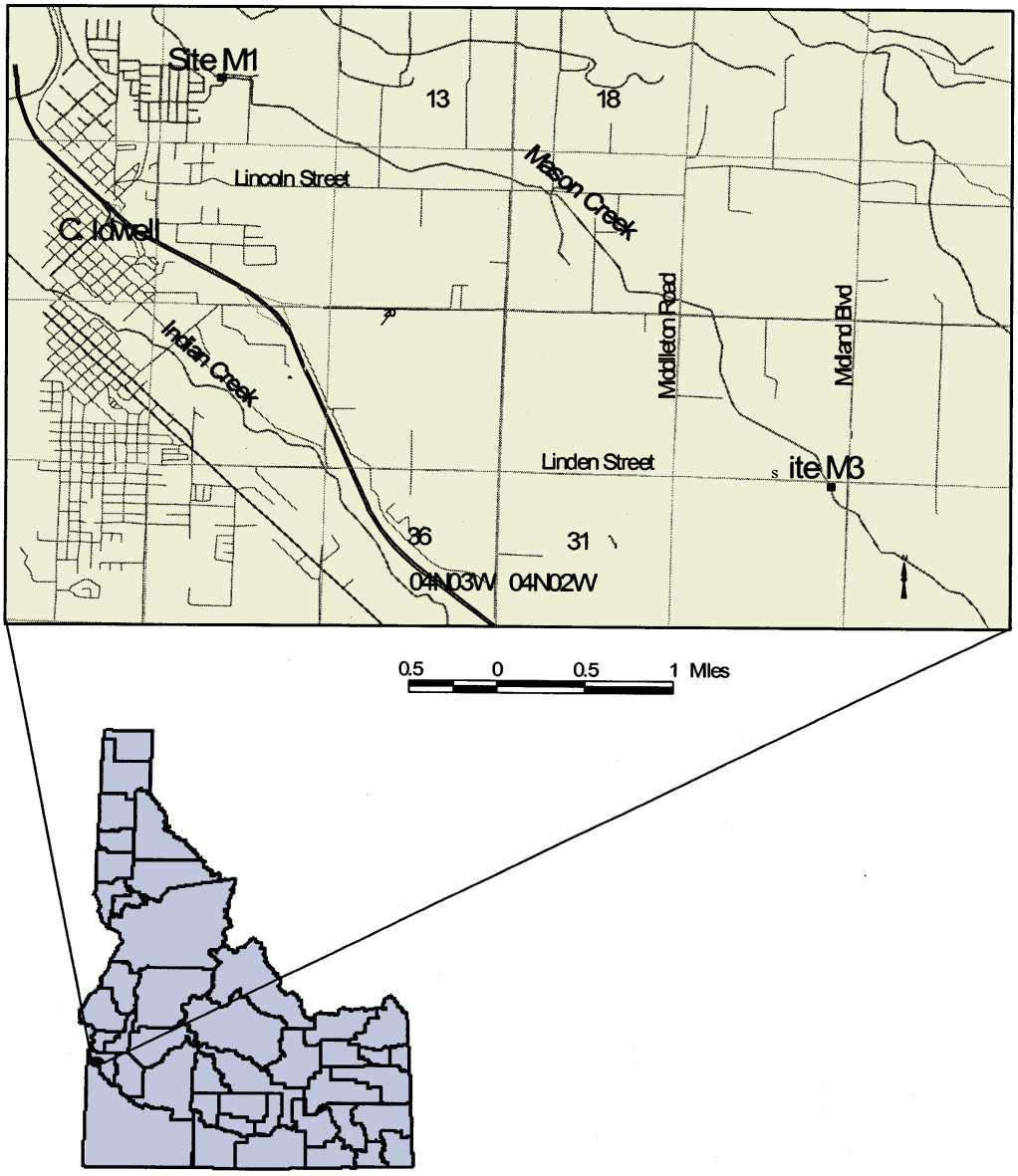
Based on the results of the study, the ISDA recommends that measures to reduce nutrient impacts on ground water be addressed and implemented. The ISDA recommends that:

- The methods and approach of this study could be used as a model for a BMP effectiveness evaluation for nitrate and phosphorous leaching at agricultural sites.
- Findings from this study can be used to educate farmers, Soil Conservation District personnel, and other agricultural stakeholders.
- Nutrient management plans should be implemented on farms to prevent nutrients leaching from the shallow ground water.

The entire hard copy of the project report, *Ground and Surface Water Interaction Related to Nutrients within Mason Creek Agricultural Drain,* is available for public use at DEQ's State Office, 1410 North Hilton Street, Boise, ID 83706. Contact Ms. Barbara Mallard at (208) 373-0502. The report is also available on ISDA's website at **http://www.agri.state.id.us/PDF/gw/MasonCreek3-27-02.pdf**.

FIGURE 6

Location Map for Mason Creek Project



REFERENCES

1999 Idaho Nonpoint Source Management Plan, Department of Environmental Quality.

1998 Phase II Cascade Reservoir Watershed Management Plan, author Tonya Dombrowski.

Handbook of Valley County Storm Water Best Management Practices, 1997, Brown and Caldwell.

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